

SOME LICHENS OF TROPICAL AFRICA. II. USNEA

CARROLL WILLIAM DODGE*

Through the kindness of Sir Edward Salisbury, Director of the Royal Botanic Gardens at Kew, I have had an opportunity to study a large accumulation of unnamed Tropical and South African lichens, of which nearly half belong in the genus *Usnea*. At about the same time I received a smaller collection from the East African Herbarium at Nairobi, Kenya, through the kindness of Dr. Bernard Verdcourt. I also wish to express my appreciation of the courtesies of Mr. Hamilton, then Acting Curator of the Herbarium of the Art Galleries of the Glasgow Corporation, for permission to study types in the Stirton Herbarium, and of Dr. John Ramsbottom and the late Miss Annie Lorrain Smith at the British Museum, during my stay in these institutions while a John Simon Guggenheim Memorial Foundation fellow in 1930. I am also indebted to Dr. I. Mackenzie Lamb for permission to study specimens at the Farlow Herbarium, and to Dr. Ove Almborn for a few African specimens.

Most of the species previously reported by Motyka¹ were represented in these collections as well as several previously undescribed species. On microscopic study, I have transferred a few of Motyka's species to other sections or subsections and have rewritten my key² to include the new species. Wherever there might be ambiguity, as when a species is somewhat intermediate between sections, I have included it in both. Since some of the South African species also occur in Tropical Africa and the present collections contain some material from South Africa and Madagascar, I have also included species reported by Motyka from those regions, i. e. all species of the African continent and of the adjacent islands south of 15° N. latitude.

Where I have seen specimens, the colors are recorded from comparison with Ridgway (Color standards and color nomenclature. 44 pp. 53 pl. Washington, D. C. 1912). Measurements of the cortex, algal layer, medulla, and axis should not be taken too literally, as proportions of these parts are more constant in a given species than the absolute measurements. It should also be remembered that the thickness of the medulla as given by Motyka includes the algal layer as well as the medulla proper. In groups with a thick medulla, the thickness of the algal

¹ Motyka, J. *Lichenum generis Usnea studium monographicum*. 651 pp. Leopoldi 1936-38.

Motyka, J., & R. Pichi-Sermolli. *Usneae in Missione ad Lacum Tana et Semièn a R. Pichi-Sermolli anno 1937 lectae*. *Webbia* 8:383-404. 1952.

Motyka, J. *O kilku nowych i mniej znanych gatunkach rodzaju Usnea. Species nonnullae novae vel minus cognitae generis Usnea [I.]*. *Frag. Florist. Geobot.* 1²:25-37. 1954.

² Dodge, Carroll W. *Some lichens of Tropical Africa [I]*. *Ann. Mo. Bot. Gard.* 40:271-401. (See pp. 380-383). 1953.

* Missouri Botanical Garden, St. Louis, Mo.

layer does not make much difference in the final ratios of the medulla to cortex or axis, but it does in a few species with a thin medulla, as the algal layer shows less variation in thickness from species to species than the other structures. As far as possible transverse sections of a branch were made just above the first dichotomy or branch, or, if an articulate species, from the middle of the first joint above the first branch. If the basal portion of the plant were missing, I sectioned the basal end of the portion available. As apothecia are often few and apothecial structures are quite constant throughout the genus, I have seldom sectioned the apothecia.

The species numbers in the following key are those used in the present monograph to be continued in the next number of the ANNALS (Vol. 44, No. 1), and the new taxa herein described are numbered as in the key.

KEY TO USNEA IN AFRICA SOUTH OF 15° N.

1. Algae *Trentepohlia*; thallus grayish green, sometimes drying yellowish, rigid, 3–10 cm. tall; axis 250–1150 μ in diameter; medulla compact, usually thinner than the cortex.....ROCELLINAE 2
1. Algae *Trebouxia* or protococcoid.....8
2. Thallus eramulose (rarely a few spinules may grow out *in situ* as short pseudoramuli in *U. perhispidella*)3
2. Thallus clearly ramulose and fertile; exciple reticulate-rugose; axis hollow.....7
3. Apothecia present, marginal cilia rare, distant; surface of the thallus papillate.....4
3. Apothecia absent5
4. Apothecia 8 mm. in diameter, almost eciliate; thallus not spinulose, up to 8 cm. tall; axis hollow; saxicole; S. Rhodesia.....1. *U. cervicornis* Dodge
4. Apothecia 3–5 (–6) mm. in diameter, cilia rare, short, subdistant; thallus spinulose-isidiose from small papillae; axis solid; corticole; S. Sudan and Kenya.....2. *U. perhispidella* Steiner
5. Axis solid, surface not eroded; thallus up to 8 cm. tall; soredia white, isidiose on low tubercles but appearing farinose after isidia are shed; corticole; Uganda, Tanganyika, and Natal.....3. *U. sorediosula* Müll. Arg. in Motyka
5. Axis very slightly lacerate, surface longitudinally eroded and somewhat angular, composed of interwoven strands of thick-walled hyphae; thallus 3–4 cm. tall; soralia farinose, soredia dark fuscous; saxicole.....6
5. Axis lacerate with many small cavities, surface smooth; thallus internodes short below and above, longer in mid-portion, tips recurved, surface minutely verrucose, each verruca producing a single isidium; both saxicole and corticole; Kenya and Uganda.....4. *U. nutans* Dodge
5. Axis hollow, loosely stuffed with brown hyphae; thallus branched near the base, ultimate branches 7 cm. long, densely isidiose-spinulose throughout; saxicole; Tanganyika.....5. *U. Dodoniae* Dodge
6. Medulla K— or slightly yellowing; thallus sparingly dichotomous, 4 cm. tall, 1 mm. in diameter; Southwest Africa*U. hereoensis* (Vainio) Darb.
6. Medulla K red; thallus repeatedly dichotomous, 3 cm. tall, 0.5–0.7 mm. in diameter; southwest Angola.....*U. mossamedana* (Vainio) Darb.
7. Apothecia up to 15 mm. in diameter; exciple ramulose along the ridges; marginal cilia crowded, 2 mm. long; disc white-pruinose; ramuli dense throughout; axis 1.5 mm. in diameter, with a large cavity; arboricole; Uganda.....6. *U. pulvinulata* Dodge
7. Apothecia 5–7 (–10) mm. in diameter; exciple not ramulose; marginal cilia not crowded, 3 mm. long; disc buffy brown, not pruinose; ramuli irregularly disposed, 4–5 mm. long; axis 0.75 mm. in diameter, cavity rather narrow; saxicole; Kenya, Tanganyika.....7. *U. Liechtensteinii* Steiner
8. Axis hollow or loosely stuffed in larger branches; apothecia ciliate, rarely eciliate; thallus smooth or papillate, not scrobiculate; soredia isidiose.....Subg. EUMITRIA 9
8. Axis solid, rarely somewhat lacerate or with a very narrow stuffed cavity.....Subg. EUUSNEA 21

9. Thallus distinctly angled or at least with papillae in dense rows.....10
9. Thallus terete, not angled nor with papillae in dense rows.....11
10. Thallus olive green, 2- to 3-angled; cortex continuous, larger ramuli smooth; soredia isidiose along ridges between the rare ramuli; coastal Kenya, Tanganyika.
.....*U. cristata* Motyka
10. Thallus light brownish olive below, shading through Isabella color to chamois above; cortex subareolate, larger ramuli foveolate, sparsely papillate below; apothecia up to 20 mm. in diameter, exciple smooth or papillate with radial ridges; mountains of Tanganyika.....8. *U. subcristata* Dodge
11. Cavity narrow, or axis lacerate and cavity more or less stuffed with hyphae.....12
11. Cavity very wide and distinct, usually not stuffed.....14
12. Thallus almost eramulose with a few irregular ramuli, persistently ashy green, branches perpendicular, straight or irregularly flexuous, 10 cm. tall, 2 mm. in diameter, tapering gradually to the tips, slightly rugulose, sorediose; Angola.
.....*U. Welwitschiana* Motyka
12. Thallus ramulose, 5-10 cm. tall, branches divergent; fertile, exciple slightly rugulose or smooth.13
13. Medulla rose; ramuli 2 mm. long, slender, perpendicular, dense; apothecia 7 mm. in diameter, exciple ciliate; disc flesh-color, marginal cilia few and short; Kenya to Bechuanaland, (CERATINAE).....85. *U. acanthera* Vainio
13. Medulla white; ramuli 4-5 mm. long, thick, sparse to dense, appressed to the branches; apothecia up to 10 mm. in diameter, exciple and margin eciliate; Kenya, Tanganyika (ROCELLINAE).....7. *U. Liechtensteinii* Steiner
14. Thallus eramulose, sorediose.15
14. Thallus ramulose.17
15. Medulla rose, cavity loosely filled; thallus 20 cm. long; Congo, Kenya.....9. *U. elata* Motyka
15. Medulla white, cavity densely filled with yellow hyphae; thallus 30 cm. long; Madagascar.
.....16
16. Soredia granulose, isidiose from the tubercles over the whole plant.....*U. sororia* Motyka
16. Soredia on capitiform tubercles, 1 mm. in diameter, mostly on the lateral branches.
.....*U. sororia* f. *bisorediata* Motyka
-18
17. Thallus fertile, not sorediose.....19
17. Thallus sterile, sorediose.....19
18. Branches slightly inflated; apothecia 7-10 (-15) mm. in diameter; exciple convex, papillate to ciliate; marginal cilia rare; disc pruinose; medulla rose; Cameroons to Tanganyika.....11. *U. formula* Motyka
18. Branches not inflated; apothecia up to 20 mm. in diameter, plane; exciple slightly verrucose and venose-rugulose; marginal cilia close; disc cinnamon; medulla white, pale rose next the axis; Uganda, Congo.....12. *U. medio-africana* Dodge
18. Branches not inflated; apothecia 1-2 mm. in diameter; exciple convex, smooth, marginal cilia close; disc carneous, white-pruinose; medulla white; Uganda...10. *U. nana* Dodge
19. Thallus 1-1.2 mm. in diameter, ramulose below, nude above; St. Helena, Cameroons to Tanganyika and south to Réunion.....*U. implicata* (Stirton) Zahlbr.
-20
19. Thallus 2 mm. in diameter, ramulose throughout.....20
20. Thallus remaining greenish ashy, soredia isidiose on tubercles, especially on the ramuli; Madagascar, Tanganyika.....*U. Baileyi* (Stirton) Motyka
20. Thallus drying Mars brown to russet with paler ramuli in the herbarium; a few small tubercles producing single minute isidia, not sorediose; Uganda...13 *U. brunnescens* Dodge
-FOVEATAE 22
21. Thallus scrobiculate or foveolate, epapillate; flaccid, base not blackened.....27
21. Thallus terete or angled, usually more rigid; base often blackened.....23
22. Thallus white to pale green, 14-20 cm. long, not fruticulose, very flaccid; saxicole.....23
22. Thallus darker colored, 9 cm. or less tall, somewhat fruticulose but rather flaccid.....24
23. Thallus white, green-punctate, 14 cm. long (incomplete), 1.5 mm. in diameter, summits capillaceous; apothecia 2 mm. in diameter, lateral on larger branches, eciliate; S. Africa (AMABILES).....*U. primitiva* Motyka
23. Thallus drying clay color, partly somewhat fuscous, 20-30 cm. long, not contorted, 1 mm. in diameter, summits short; apothecia and soredia unknown; Cameroons.
.....14. *U. versicolor* Motyka
24. Thallus flattened, 3 cm. tall, 2 mm. in diameter; apothecia up to 15 mm. in diameter, densely ciliate; Ethiopia.....15. *U. complanata* (Müll. Arg.) Motyka
24. Thallus not distinctly flattened; sorediose.....25

25. Thallus up to 12 cm. tall, 2 mm. in diameter, acutely rugose; Ethiopia to Tanganyika.
.....16. *U. corrugata* Motyka
25. Thallus 6-7 cm. tall, not acutely rugose.....26
26. Branches closely ramulose; soredia in farinose tubercles; Ethiopia to Comoro Islands
(see also f. *eciliata* Motyka).....17. *U. pulverulenta* (Müll. Arg.) Motyka
26. Branches sparsely and irregularly ramulose; soredia isidiose on low ridges, cortex of
larger branches not areolate; French Guinea, Angola to S. Africa, Madagascar and
Comoro Islands.....*U. leprosa* Motyka
27. Thallus articulate with pseudocyphellae but not papillate, inflated, (10-) 25-40 cm. long,
medulla very lax.ARTICULATAE 28
27. Thallus continuous or, if articulate, without pseudocyphellae, often fruticose, papillate,
and ramulose.35
28. Thallus up to 60 cm. long, 2.5 mm. in diameter, pale stramineous; joints 4-10 (-30)
mm. long, only slightly inflated; ramuli 10 mm. long; isidiose on some joints, not
on others; Eritrea to Tanganyika.....18. *U. flavescens* Motyka
28. Thallus (10-) 25-60 cm. long, eramulose or with only an occasional ramulus.....29
29. Pseudocyphellae elevated, conspicuous; thallus stramineous.....30
29. Pseudocyphellae not elevated, rather inconspicuous; thallus usually fuscous in the
herbarium.....31
30. Thallus foveolate, 40-60 cm. long, 2 mm. in diameter; joints 5 (-10) mm. long;
soredia along ridges; pale irregular "cephalodia" often present; Eritrea, Somaliland
and S. Africa.....19. *U. praelonga* Stirton
30. Thallus smooth, up to 40 cm. long, 2 mm. in diameter, joints 0.3-20 mm. long;
apothecia 5 (-10) mm. in diameter, marginal cilia few; Sierra Leone to Cameroons.
.....20. *U. pseudocyphellata* Motyka
31. Thallus up to 30 cm. long, 2.5 mm. in diameter, relatively rigid, joints up to 70 mm.
long, curved; Sierra Leone to St. Helena.....21. *U. speciosa* Motyka
31. Thallus 10-40 cm. long, flaccid, joints 10-30 mm. long, nearly straight.....32
32. Thallus smooth or only slightly deformed.....33
32. Thallus foveate to rugose.....34
33. Thallus 15-25 cm. long, 1-1.4 mm. in diameter, stramineous or pale stramineo-fuscous;
apothecia 5-7 mm. in diameter, exciple smooth, marginal cilia dense and long;
S. Africa and Madagascar.....*U. flexilis* Stirton
33. Thallus up to 60 cm. long, up to 3 mm. in diameter, lurid fuscous, summits long, capilla-
ceous; apothecia rare, 2-4 mm. in diameter, exciple lacunose, marginal cilia few
but long; Kenya to Nyasaland, and Angola.....22. *U. vesiculata* Motyka
33. Thallus 20 cm. long, 1 mm. in diameter, sepia, summits cream buff, joints scarcely
inflated; apothecia and soredia unknown; Tanganyika to S. Africa (STRAMINEAE,
AMOENAE).....30. *U. moniliformis* Motyka
33. Thallus only 10-15 cm. long, 0.5 mm. in diameter, summits inconspicuous, sterile and
esorediose; Ethiopia to Tanganyika.....23. *U. deminuta* Motyka
34. Thallus foveate to scrobiculate on larger joints (25-30 × 4-5 mm.), smooth on
smaller joints (5-10 × 1-1.4 mm.) with small soralia of isidiose soredia on smaller
non-articulate branches; ramuli 5 mm. long on smaller branches; corticole; Ethi-
opia and Kenya.....24. *U. articulata* subsp. *aethiopica* Dodge
34. Thallus foveolate, pale fuscous, up to 20 cm. long, 1-3 mm. in diameter, summits
capillaceous; soredia pale sulfur color in large soralia; saxicole; Kenya, Tangan-
yika and Congo.....25. *U. terrestris* Motyka
34. Thallus partly foveolate to rugose on larger joints, not on others, 20 cm. long; joints
up to 10 × 2 mm. alternating with short joints 0.3 mm. in diameter, reddish
fuscous; no pseudocyphellae; no apothecia nor soredia known; Kenya, Uganda,
Tanganyika (RUBIGINEAE).....79. *U. erubescens* (Stein) Motyka
34. Thallus longitudinally rugose, lurid fuscous, up to 65 cm. long, up to 4 mm. in
diameter, summits short, curved, more densely branched; apothecia about 5 mm.
in diameter, marginal cilia few; Ethiopia.....26. *U. rugosa* Motyka
35. Thallus either persistently stramineous, yellow, or soon becoming fuscous in the herbar-
ium; cortex thin, papery, or, if thicker, very smooth, medulla usually thick and lax
(often relatively thinner and more compact in the STRAMINEAE, SULCATAE).....36
35. Thallus ashy green, rarely red or, if stramineous, then papillate or tuberculate, seldom
and very late fuscous in the herbarium.....60
36. Thallus subarticulate, elongate, rather flaccid, mostly more than 20 cm. long.
.....STRAMINEAE 37
36. Thallus short, under 15 cm. long, fruticose and usually more rigid.....GLABRATAE 46

37. Thallus stramineous, pale yellow or pale fuscous, subarticulate, usually eramulose; sterile (very rarely fertile in *U. gracilis* Ach.).....AMOENAE 39
37. Thallus stramineous when fresh, soon fuscous in the herbarium, abundantly ramulose.....38
38. Thallus terete.EUSTRAMINEAE 41
38. Thallus longitudinally rugose to angled and sulcate.....SULCATAE 43
39. Thallus finally pale fuscous in the herbarium, 0.5 mm. in diameter; medulla about equal the axis in thickness, K—; Ethiopia to Nyasaland, Madagascar to Réunion.
.....28. *U. gracilis* Ach.
39. Thallus persistently stramineous, 0.6 mm. or less in diameter; medulla thicker than the axis, K red; Ethiopia, Kenya and Uganda.....27. *U. Vainioana* Zahlbr.
39. Thallus pale fuscous in the herbarium, 1 mm. or more in diameter, more rigid; summits capillaceous, medulla K— or yellow.....40
40. Ramuli confined to small clusters in upper portions of the branches; joints variable in length, up to 1.3 mm. in diameter, many inflated, clearly annulate; medulla K yellow; St. Helena and Fernando Po.....29. *U. pulchella* Motyka
40. Ramuli very rare or absent, not in clusters; thallus 1 mm. in diameter below, joints 1–3 (–10) mm. long, not constricted nor inflated, less annulate; medulla K—; Kenya to S. Africa.....30. *U. moniliformis* Motyka
41. Thallus rose or copper-rose, medulla K—, 30 cm. long, 2–3 (–4) mm. in diameter; irregularly ramulose; no apothecia nor soredia known; saxicole; Ethiopia.....*U. saxatilis* Motyka
41. Thallus becoming fuscous, sorediose, medulla K yellow or red.....42
42. Thallus 17 cm. long, 0.8 mm. in diameter, very flaccid; joints not constricted at crack but limbiform, dilated; medulla thick, dense, continuous in cracks, K yellow then red; Rodrigues Island.....*U. dasypogoides* Nyl.
42. Thallus about 20 cm. long, 2.5 mm. in diameter, soft, foveolate, irregularly articulate, surface indistinctly and minutely papillate; medulla K yellow, then red; Mauritius, Rodriguez, Comoro, and Seychelles and Socotra islands.....31. *U. straminea* Müll. Arg.
42. Thallus 30–35 (–60?) mm. long, branches up to 2 mm. in diameter below, becoming capillaceous above, indistinctly articulate, surface with oblong ridges, farinose; medulla K yellow; apothecia rare, 2–3 mm. in diameter, exciple slightly rugose with few marginal cilia; soredia on ramuli; Kenya, Congo, Uganda and Tanganyika.
.....32. *U. exasperata* (Müll. Arg.) Motyka
43. Thallus longitudinally rugulose and subfoveolate, over 25 cm. long, 1 mm. in diameter, very minutely papillate on some joints, smooth on others, tips capillaceous, densely branched; ramuli close but irregularly disposed; apothecia lateral on secondary branches, up to 10 mm. in diameter; Egypt to Ethiopia and northern Kenya (BARBATAE, PENDULINAE).....33. *U. Pinkertonii* Stirton
43. Thallus up to 20 cm. long, 1.5 mm. in diameter, obliquely or longitudinally rugose, not sulcate, tips capillaceous; ramuli rare and irregularly disposed, longer on the thinner branches; soredia isidiose; Kenya to S. Africa.....35. *U. fusca* Motyka
43. Thallus more than 55 cm. long, about 1.5 mm. in diameter, longitudinally rugose, ridges low, thin, tops farinose, not sulcate between ridges; ramuli irregularly disposed, up to 30 mm. long, tuberculate, forming isidiose soredia; Cameroons.
.....34. *U. cameroonensis* Dodge
43. Thallus more angled and deeply sulcate between ridges on larger branches.....44
43. Thallus articulate, red-fuscous, alternating joints 10×2 mm. and very short, 0.3 mm. in diameter, some joints rugose or foveate, others smooth; no apothecia nor soredia seen; Kenya, Uganda, Tanganyika (RUBIGINAE).....79. *U. erubescens* (Stein) Motyka
44. Main branches up to 2 mm. in diameter; thallus over 40 cm. long, acutely angled and longitudinally rugose, deeply foveate between the ridges; ramuli close, smaller 5 mm. long, mixed with much longer, thick below with obtuse tips; apothecia unknown; isidiose soredia on tubercles on some ramuli; Kenya and Uganda.
.....36. *U. decipiens* Motyka
44. Branches 1.3 mm. or less in diameter; apothecia about 10 mm. in diameter.....45
45. Branches 1.3 mm. in diameter, thallus up to 60 cm. long, acutely angled and sulcate; ramuli irregularly disposed, 4–5 mm. long, base thick, tips acute; summits densely dichotomous; Uganda to Natal.....37. *U. aequatoriana* Motyka
45. Branches 0.5 mm. in diameter, thallus only 13 cm. long, obtusely angled, cortex scaling; ramuli disposed along the whole thallus, 3–10 mm. long, fibrilliform; Uganda and Tanganyika to South Africa.....38. *U. flaccida* (Müll. Arg.) Motyka
46. Thallus subarticulate, sparingly ramulose; medulla lax, sterile.....PYCNOCLADAE 47
46. Thallus subarticulate or continuous, ramulose; medulla lax, fertile.....CILIFERAE 51

46. Thallus with abundant spinules; medulla lax, fertile (also sorediose in *U. undulata* Stirton).....SCABRIDAE 56
46. Thallus persistently yellow-stramineous, sorediate and sparingly fertile; medulla thick and lax.....XANTHOPOGAE 58
46. Thallus pale ivory yellow (becoming fuscous in *U. incrassata*), sterile (fertile in *U. amaniensis* [LONGISSIMAE] which might be referred here); medulla dense under the cortex, becoming lax near the axis; eramulose.....OSSEOLEUCAE 59
47. Thallus 8-10 cm. long, minutely verrucose, sometimes with reticulate ridges, giving a subfoveolate appearance; eramulose (sometimes isidiose soredia develop *in situ* to form dense clusters of pseudoramuli); terricole; Cameroons.....39. *U. terricola* Dodge
47. Thallus about 15 cm. tall, very indistinctly papillate, papillae cylindrical; ramuli 1-2 mm. long, very slender; Tanganyika, Uganda and N. Rhodesia.
.....40. *U. hispidula* (Müll. Arg.) Motyka
47. Thallus up to 15 cm. tall, with distinct rugi but nearly terete; ramuli irregularly disposed, variable in length and thicker; Tanganyika, Sudan and Madagascar.
.....41. *U. usambarensis* Motyka
47. Thallus shorter, usually much under 10 cm. tall.....48
48. Ramuli few; thallus 2.5 cm. tall, divergently branched, persistently pale stramineous, terete; medulla K—; soredia isidiose in minute soralia; South Africa.....*U. delicata* Vainio
48. Ramuli irregularly dense.....49
48. Eramulose.....50
49. Thallus 7-10 cm. tall, 2 (-2.5) mm. in diameter, fuscous; medulla K red; soredia white to yellowish, in tubercles; Congo to Cape of Good Hope.....42. *U. cartilaginea* Laurer
49. Thallus up to 5 cm. tall, 1-1.5 mm. in diameter, old gold to Isabelline; medulla K yellow, becoming red then fuscescent (reddish fuscous); soredia isidiose; Kenya and Uganda to S. Africa; Madagascar (*U. pulvinata* Motyka, *p. p.*)
.....43. *U. transvaalensis* Vainio
49. Thallus 4 cm. tall, 1 mm. in diameter, fuscous; medulla K—; soredia in indistinct tubercles; Ethiopia to Tanganyika.....44. *U. ruwenzoriana* Motyka
50. Thallus 7 cm. tall, 1 (-1.5) mm. in diameter, rose to copper-red; medulla K indistinctly yellowish fuscescent; soredia in slightly elevated oblong soralia; S. Africa to Madagascar.....*U. Havaasii* Motyka
50. Thallus up to 10 cm. tall, 1.5 (-2) mm. in diameter, ashy green to tawny olive; medulla K—; soredia isidiose in large hemispheric soralia, becoming farinose; Cameroons, Angola, Congo and Uganda.....45. *U. Haumanii* Motyka
51. Branches almost cylindrical, subsimple, indistinctly inflated; apothecia up to 5 mm. in diameter; Uganda.....46. *U. simplicissima* Motyka
51. Branches distinctly inflated, more or less closely branched.....52
52. Thallus distinctly and grossly papillate, branches foveate and deformed; apothecia 6 mm. in diameter; Mauritius, Réunion, and South Africa.....47. *U. fuscorubens* Motyka
52. Thallus indistinctly papillate; apothecia much larger (except in *U. submollis* Steiner).....53
53. Thallus 3-5 cm. tall, olive fuscous in the herbarium; apothecia 1.5-3 mm. in diameter, exciple smooth; marginal cilia few; Cameroons to South Africa.....48. *U. submollis* Steiner
53. Thallus 9 cm. tall, 2 mm. in diameter, tawny olive with cinnamon-buff, subdistant ramuli; apothecia 11-12 mm. in diameter, exciple minutely verrucose with low radial ridges from conerescent axis and ramuli; marginal cilia distant, 10 mm. long; Tanganyika.....49. *U. blepharoides* Dodge
53. Thallus 7-15 cm. tall, deep fuscous in the herbarium; apothecia 10-15 mm. in diameter.....54
54. Apothecia up to 15 mm. in diameter; exciple papillate, radiate-foveolate or reticulate in the center; marginal cilia abundant, flexuous; thallus 15 cm. tall, up to 5 mm. in diameter, dark fuscous; ramuli rather rare and irregularly disposed; Congo, Uganda.....*U. ruvidescens* (Jatta) Motyka
54. Apothecia up to 10 mm. in diameter.....55
55. Thallus up to 10 cm. tall, 2 mm. in diameter; exciple smooth to spinulose; Tanganyika and Comoro Islands.....*U. blepharea* Motyka
55. Thallus about 7 cm. long, 1 mm. in diameter; exciple smooth to foveolate; marginal cilia distant, 5 mm. long; Fernando Po, Congo, South Africa, and Madagascar.
.....50. *U. molliuscula* Stirton
55. Thallus 8 cm. tall, 1.5-2 mm. in diameter; exciple smooth, ramulose; marginal cilia numerous, short, obtuse, thick, almost inflated; Ethiopia to Tanganyika.
.....51. *U. obtusata* Motyka f. *perstrigosa* Motyka

56. Thallus 9–30 cm. long, 1.5 mm. in diameter; soredia isidiose, dispersed over most of the branches, spinules not seen; apothecia 7 mm. in diameter, exciple smooth to foveolate with short spinules; marginal cilia few, short; Kenya to Cape of Good Hope.....52. *U. undulata* Stirton
56. Esorediose; apothecia smaller.....57
57. Thallus about 30 cm. long, 0.6 mm. in diameter; spinules minute; ramuli perpendicular, variously curved, the larger branched; apothecia about 6 mm. in diameter; exciple nearly smooth, marginal cilia dense, variously curved and branched, up to 12 mm. long; Tanganyika to Cape of Good Hope and Madagascar.....53. *U. strigosella* Steiner
57. Thallus about 5 cm. tall, 1.2 mm. in diameter; ramuli 3 mm. long; Cameroons to Kenya, Rhodesia and Lourenço Marques.....54. *U. perspinosa* Motyka
58. Thallus about 9 cm. tall, branches up to 2 mm. in diameter, sulfur to yellowish; sterile; Madagascar.....56. *U. sulphurascens* Motyka
58. Thallus up to 8 cm. tall, 1.5–2 mm. in diameter; ramuli rare; apothecia 3–5 mm. in diameter; Madagascar and Mauritius.....55. *U. luteola* Motyka
58. Thallus 4 cm. tall, 0.5–1.2 mm. in diameter; eramulose (smaller thalline branches simulate ramuli); apothecia 8 mm. in diameter; Madagascar.....*U. chrysoleuca* Motyka
59. Both fertile and sorediose (see no. 58 above, *U. luteola* Motyka and *U. chrysoleuca* Motyka).
59. Sorediose only.60
59. Fertile only; thallus up to 60 cm. long, about 1 mm. in diameter, prostrate with tips of short branches or ramuli forming secondary holdfasts, chamois to deep colonial buff; apothecia 3–5 mm. in diameter, exciple smooth, eciliate (LONGISSIMAE).
.....*U. amaniensis* Dodge
60. Thallus 15 cm. long, persistently osseoleuco-stramineous, 0.6–0.8 mm. in diameter; Madagascar.....*U. Humberti* Motyka
60. Thallus 8.5 cm. (incomplete) long; primary branch 3 mm. in diameter, secondary branches (1–) 1.5 mm. in diameter, becoming fuscous in the herbarium; medulla K red then blackening; Tanganyika.....*U. incrassata* Motyka
61. Thallus unchanging or late becoming fuscous in the herbarium; medulla thick, lax, cortex thin; irregularly branched, papillate tuberculate or sub-smooth, apices rather thick.....DENDRITICAE 62
61. Thallus unchanging, never fuscous; medulla relatively thin, compact; cortex thick, often horny (sometimes scaling and more or less ecorticate); branching more regular.....73
62. Thallus without pseudocyphellae and not white-maculate.....CLADOCARPEAE 64
62. Thallus with pseudocyphellae or white-maculate.....63
63. Thallus abundantly ramulose, fertile.....ALBOMACULATAE 69
63. Thallus eramulose or nearly so, sorediose or fertile, more or less rugose with pseudocyphellae or small farinose spots.....SERPENTARIAE 71
64. Thallus about 20 cm. long, pendent, flaccid, sterile (sparingly fertile in *U. subleprosa*); South Africa.65
64. Thallus about 10 cm. tall, erect or prostrate, rather rigid below, surface subrugose and subfoveate on smaller branches; sterile; Eritrea (BARBATAE, COMOSAE).
.....57. *U. syriaca* Motyka
64. Thallus 5–15 cm. tall, more fruticose and rigid; fertile (also sorediose in *U. Ledienii*).....66
65. Thallus 0.6 mm. in diameter, becoming ferrugineo-fuscous, tuberculate and papillate, strigose-ramulose; soredia spinuliform; Cape of Good Hope.....*U. filamentosa* Motyka
65. Thallus 1–2 mm. in diameter, olive-green, verruculose-papillate; apothecia up to 7 mm. in diameter, exciple sublacunose, verruculose, sorediose; marginal cilia few or none; Kenya to Transvaal.....58. *U. subleprosa* Motyka
65. Thallus 1.5–2 mm. in diameter, pale ashy stramineous, foveolate, impressed, papillae minute, cylindrical; eramulose; Cape of Good Hope.....*U. cornea* Motyka
66. Exciple smooth or slightly verrucose or rugulose.....67
66. Exciple papillate.68
66. Exciple foveate to scrobiculate, 10 mm. in diameter; thallus 7 cm. tall, citrine drab to dark olive buff; ramuli close, the shorter 1–3 mm. long, smooth, the longer up to 15 mm. long, isidiose-sorediose in tuberculate soralia; Cameroons to Uganda.
.....59. *U. Ledienii* (Stein) Motyka
67. Apothecia (5–) 10 (–15) mm. in diameter; thallus up to 15 cm. tall, sepia to bone brown in the herbarium; ramuli subdistant on larger branches, closer on smaller branches, 2–10 mm. long, the shorter smooth, the longer somewhat tuberculate but not sorediate; Cameroons to Angola.....60. *U. hispida* Motyka

67. Apothecia 5 mm. in diameter; thallus 10 cm. tall, Saccardo's umber and buffy brown; ramuli wood-brown to avellaneous, subdistant, 5 mm. long; Eritrea to South Africa.....61. *U. ochrophora* Stzbr. in Motyka
67. Apothecia up to 9 mm. in diameter; thallus about 5 cm. tall, buffy clive to yellowish olive; eramulose; Sudan to Tanganyika.....62. *U. subfoveata* Dodge
68. Thallus about 7 cm. long, warm sepia to Verona brown; ramuli 1-10 mm. long, the shorter spinuliform, the longer tuberculate but not sorediate; apothecia 5-8 mm. in diameter; papillae long-capitiform; Eritrea to Tanganyika.....63. *U. trachyna* Motyka
68. Thallus 5 cm. tall, light brownish-olive to Isabelline; ramuli irregularly disposed, 2-3 mm. long, smooth; apothecia up to 15 mm. in diameter; Sierra Leone, Angola and Kenya.....64. *U. scutata* Motyka
69. Thallus becoming pale fuscous, white-spotted, cortex hard; apothecia 4-6 (-15) mm. in diameter; esorediose; Ethiopia and Sudan.....65. *U. albomaculata* Motyka
69. Thallus becoming fusco-sepia, only small pseudocyphellae white, cortex hard; apothecia 10 mm. in diameter; soredia farinose, sulfur yellow on slenderer branches; Ethiopia.*U. abissinica* Motyka
69. Thallus dirty ashy-greenish becoming pale fuscous or yellowish, only small pseudocyphellae white, cortex soft; apothecia 10 mm. in diameter; Ethiopia.51. *U. obtusata* Motyka
70. Ramuli dense, pale fuscous.....51b. *U. obtusata* f. *perstrigosa* Motyka
70. Ramuli less dense, golden yellow, branches yellowish-fuscous.51a. *U. obtusata* f. *perflava* Motyka
71. Thallus olive green; branches up to 2.5 mm. in diameter; medulla thick (980 μ) soredia isidiouse in punctiform soralia; Cape Verde, Cameroons, Cape of Good Hope.66. *U. Bornmuelleri* Steiner
71. Thallus sepiceous fuscous or stramineo-yellow; medulla up to 3000 μ thick.....72
72. Branches 2-3 (-5) mm. thick, papillae in low ridges; soredia in ridges at summits, isidiouse, spinuliform; Ethiopia.....67. *U. Flotowii* Zahlbr.
72. Branches 2 mm. in diameter, stramineo-yellow, verrucae hemispheric, evenly distributed or in short ridges; soredia single, ovoid-spinuliform in tuberculiform soralia, white; Madagascar.....56. *U. sulphurascens* Motyka
72. Branches 2 mm. in diameter, less distinctly papillate, ridges elevated, tops flattened; esorediose; apothecia 10 mm. in diameter, exciple farinose-spotted; Ethiopia and Kenya.....68. *U. serpentaria* Motyka
73. Medulla very thin, white, never rose; thallus fruticulose or, if over 20 cm. long, cortex reddish or reddish-maculate.....SETULOSAE
73. Medulla thicker, compact, rose or, if white, thallus over 25 cm. long, pendent; cortex not reddish nor reddish maculate.....89
74. Thallus gray-green, usually densely ramulose, 3-20 cm. tall, fruticose.....DENSIROSTRES
74. Thallus red or reddish-maculate, fruticose or pendent.....RUBIGINEAE
75. Thallus saxicole, caespitose, 5 cm. tall, unbranched or branched only at the base.....76
75. Thallus corticole, sparingly branched above the base.....78
76. Sparingly ramulose, branches few, pale olive ashy green, rather thick-fusiform, summits incurved; Uganda to South Africa.....69. *U. capensis* Motyka
76. Sparingly ramulose; branches several times dichotomous at base, tips of ramuli blackening; apothecia rare, 3 mm. in diameter, esorediose; Southwest Africa, Tanganyika, Madagascar, and Mauritius (confused with *U. transvaalensis*).70. *U. pulvinata* Fries
76. Eramulose; axis solid or slightly lacerate, surface longitudinally eroded and somewhat angular, composed of interwoven strands of thick-walled hyphae; soralia farinose, soredia dark fuscous.77
77. Medulla K— or slightly yellowing; thallus sparingly dichotomous, 4 cm. tall, 1 mm. in diameter; Southwest Africa.....*U. bereroensis* (Vainio) Darb.
77. Medulla K red; thallus repeatedly dichotomous, 3 cm. tall, 0.5-0.7 mm. in diameter; Southwest Angola.....*U. mossamedana* (Vainio) Darb.
78. Sterile and sorediose.....79
78. Apothecia present.....80
79. Thallus about 5 cm. tall, pale glaucous green, rigid, 1.5 mm. in diameter, closely sympodially branched, ramuli dense, 1-2 (-5) mm. long; soredia isidiouse on large soralia in upper part of thallus from low tubercles; Tanganyika, Angola and S. Rhodesia.....71. *U. myrioclada* (Müll. Arg.) Zahlbr.

79. Thallus about 8 cm. tall, pale stramineous, 1 mm. in diameter, divergently branched; ramuli dense but somewhat irregularly disposed; soredia isidiose in minute tuberculiform soralia, then eroded and farinose; Madagascar.....*U. ambigua* Motyka
79. Thallus 20 cm. long, pale ashy, 0.9 mm. in diameter below, with minute white tubercles; ramuli irregularly disposed, 10-30 mm. long; Togo, Fernando Po, and St. Helena.
.....72. *U. Lyngei* Motyka
80. Soredia isidiose, covering tubercles, appearing spinulose when tubercles are crowded and farinose after the isidia are shed; thallus 5-6 cm. tall, between deep olive buff and tea green, 1.5 mm. in diameter; ramuli 2-3 (-5) mm. long, irregularly dense; apothecia 3 mm. in diameter (perhaps still immature); Angola...73. *U. Gossweileri* Dodge
80. Soredia absent.....81
81. Thallus 8-10 cm. tall, 2 mm. in diameter; ramuli not abundant; papillae verruciform; apothecia up to 20 mm. in diameter; Kenya to Cape of Good Hope.
.....75. *U. picta* (Steiner) Motyka
81. Thallus up to 7 cm. tall, 1 (-1.8) mm. in diameter; ramuli dense but fragile, breaking off about 0.2 mm. from the branch and thus appearing very coarsely papillate; apothecia 5 mm. in diameter; Kenya.....76. *U. isabellina* Dodge
81. Thallus 5 cm. tall, 1 mm. in diameter, densely covered with spinules 0.5-2 mm. long, easily breaking off and the thallus appearing papillate; apothecia to 3 mm. in diameter; Congo, Angola, Kenya and Nyasaland.....74. *U. torrida* Motyka
82. Thallus pendent, 20-30 cm. long, flaccid, subarticulate.....83
82. Thallus erect, 4-12 cm. tall, rigid.....85
83. Thallus densely ramulose, soredia in tubercles on upper portions, isidiose, olive green, indistinctly red-variegated, 2 mm. in diameter; Kenya, S. Africa and Réunion.
.....77. *U. horridula* (Müll. Arg.) Motyka
83. Thallus closely ramulose, isidiose soredia in tubercles on the lower portion of ramuli; thallus deep olive-buff, pink-maculate, 1 mm. in diameter, acutely few-angled from rows of con crescent papilliform tubercles; Kenya.....78. *U. Dalei* Dodge
83. Thallus nude or with rare ramuli.....84
84. Thallus 25 cm. long, 1 mm. in diameter; soredia isidiose; thallus reddish stramineous, red-spotted; Cape of Good Hope.....*U. spilota* Stirton
84. Thallus about 20 cm. long, 2 mm. in diameter, reddish fuscidulous, articulate, thicker joints foveolate and rugose; soredia and apothecia unknown; Kenya, Uganda, Tanganyika.....79. *U. erubescens* (Stein) Motyka
85. Thallus esorediose, reddish fuscous spotted with greenish fuscidulous, 4-5 cm. tall, branches about 1.5 mm. in diameter; apothecia small, exciple tuberculate, rugulose, olive fuscous; Kenya, Tanganyika, Comoro Islands and Madagascar.
.....80. *U. subflorida* (Zahlbr.) Motyka
85. Thallus sorediose, sterile.....86
86. Thallus 10-12 cm. tall.....87
86. Thallus only 4-6 cm. tall.....88
87. Thallus 12 cm. tall, olive ashy green, deep red-spotted, 2 mm. in diameter; soredia in broad farinose soralia in the upper part of the thallus; medula K-; Congo, Cameroons and Kenya.....81. *U. bicolorata* Motyka
87. Thallus 10 cm. tall, russet below shading to ochraceous-salmon above, up to 0.9 mm. in diameter; soralia small with one to a few isidia, sometimes confluent and appearing farinose after the soredia are shed; Kenya.....82. *U. spilotoides* Dodge
88. Thallus 6 cm. tall, red or orange latericious, 1.5 mm. in diameter; soredia in pale rose or white tubercles on the more slender ramuli; medulla K red; St. Helena and S. Africa.....*U. rubescens* v. *rubrotincta* (Stirton) Motyka
88. Thallus 4-7 cm. tall, indistinctly red-spotted; soralia minute; medulla K.....89
89. Thallus greenish stramineous, 2.5 mm. in diameter, tips blackened; saxicole; Cameroons, Kenya, Tanganyika.....83. *U. Meyeri* (Stein) Motyka
89. Thallus ashy fuscidulous, 1.6 mm. in diameter, tips sorediose, not blackened; both saxicole and corticole; Sudan to S. Africa and Madagascar.....84. *U. maculata* Stirton
90. Thallus more or less deformed, not angular nor exactly terete, more than 1 mm. in diameter, frequently branched, pale green (coppery fuscous in *U. umbrata*).
.....CERATINAE 91
90. Thallus angular in cross-section, at least strongly longitudinally rugose, more than 1.2 mm. in diameter, unfrequently branched; green, rarely subfuscous.....GONIODES 96
90. Thallus terete or only very slightly longitudinally rugose, rarely branched, grayish green, often partly decorticate.....LONGISSIMAE 98

91. Medulla rose; thallus 5-8 cm. tall.....92
91. Medulla white; thallus 25 cm. or more long, pendent, sparsely and irregularly papillate or tuberculate.....93
92. Axis with a narrow cavity; thallus 1 mm. in diameter; ramuli dense, 2 mm. long; apothecia 7 mm. in diameter, exciple rugose; Kenya to Bechuanaland.....85. *U. acanthera* Vainio
92. Axis solid; thallus 1.2-1.3 mm. in diameter; ramuli rather close, 5-10 (-15) mm. long; sterile; isidia abundant, often single or in small groups on verrucae, mostly on the ramuli and small branches; Morocco and Sierra Leone.....86 *U. marocana* Motyka
93. Thallus 25 cm. long, becoming coppery fuscous, 1 (-1.5) mm. in diameter; ramuli rare, short, thick, rigid; St. Helena.....*U. umbrata* Motyka
93. Thallus 60 cm. or more long.....94
94. Fertile; apothecia 10-30 mm. in diameter, exciple smooth to subfoveolate, subglaucous; thallus 2.5 mm. in diameter; ramuli dense, the larger branched; tubercles large; medulla K-; Cap Vert, Kenya, Angola, Tanganyika, and S. Africa.....87. *U. amplissima* Stirton
94. Sterile; medulla K, at least slowly reddening or fuscous.....95
95. Thallus 1.5 mm. in diameter, cortex areolate, uneven, tuberculate, appearing subscrobiculate; soredia on tubercles, isidiose, finally farinose; medulla K red; Congo to Cape of Good Hope and Mauritius.....88. *U. distensa* Stirton
95. Thallus 1 mm. in diameter, tubercles often subseriate; soredia isidiose, usually single on verrucae, white; medulla K, slightly reddening; Congo and Kenya to Cape of Good Hope, Madagascar and Mauritius.....89. *U. Promontorii* Motyka
96. Thallus triangular in transverse section, about 30 cm. long, ashy green drying deep olive buff, 1.2 mm. in diameter, flattened at the axils and there up to 2 mm. wide; ramuli about 5 mm. long, from backs of ridges, up to 10 mm. long near the summits; apothecia up to 15 mm. in diameter, exciple rugose-reticulate and sublacunose; Tanganyika to Cape of Good Hope and Madagascar.....90. *U. goniodes* Stirton
96. Thallus with more angles, more than 50 cm. long.....97
97. Ridges high and more or less alate.....98
97. Ridges low and obtuse.....99
98. Thallus 50 cm. long, 1.2 mm. in diameter, pale olivaceous green, closely transversely fractured; almost eramulose; Kenya, Uganda, Lourenço Marques, and Madagascar.....91. *U. chloreoides* (Vainio) Motyka
98. Thallus up to 100 cm. long, 1-3 mm. in diameter, yellowish green ridges sorediate, sulcate between with minute white tubercles and papillae; ramuli 5-15 mm. long, dense, more or less branched, white tuberculate and spinulose; Congo.....*U. goniodes* v. *reagens* DeSmet & Lambion
99. Fertile; ramuli up to 40 mm. long; Bas Congo.....100
99. Sterile; ramuli 5-10 (-20) mm. long; axis 1-2 mm. in diameter.....101
100. Thallus 200 cm. long, 5 mm. in diameter, dirty ashy green, with tubercles and large papillae; ramuli 20-40 mm. long, slender, very fragile; apothecia 10 mm. in diameter, exciple uneven; Congo.....*U. gigas* Motyka
100. Thallus 70 cm. or more long, 1-2 mm. in diameter, grayish green; ridges corticate or with a few isidiose tubercles, plane between the ridges with isidiose tubercles; lateral branches 10-20 (-40) mm. long, 0.4-0.6 mm. in diameter, more or less isidiose-tuberculate; true ramuli slenderer, 0.2-0.3 mm. in diameter, annularly cracked; apothecia up to 15 mm. in diameter; exciple smooth; marginal cilia few or none; disc chalky white-pruinose; Congo.....92. *U. Fernandiae* Duvign.
101. Thallus 100-110 cm. long, 1.6 mm. in diameter, dark olive buff; ramuli 4-10 (-20) mm. long; soredia isidiose on tubercles; Nigeria, French Guinea, Congo, Uganda, Tanganyika, Transvaal.....93. *U. africana* Motyka
101. Thallus 70 cm. or more long 1-2 mm. in diameter, grayish green, summits attenuate; transversely cracked with isidiose tubercles along the cracks; ramuli 5-10 mm. long, isidiose-tuberculate; Congo.....94. *U. bakongensis* Duvign.
102. Cortex well developed, on primary branches, continuous or areolate, seldom scaling off.....103
102. Cortex soon scaling off on the primary branches.....108
103. Main axes flattened in places, indistinctly longitudinally rugose; fertile.....104
103. Main axes nearly terete, at least not flattened except in the axils.....105

104. Thallus 100 cm. long, 0.8 mm. in diameter, flattened in places to 2 mm. wide, dark olive buff; medulla faintly rose, K reddening; ramuli irregularly disposed, flattened at the base, tips often blackened; apothecia 3-4 mm. in diameter, plane; exciple slightly impressed; marginal cilia about 12, variable in length; disc carneous, densely white-pruinose; Sierra Leone to Cameroons.....95. *U. livida* Motyka
104. Thallus 80 cm. or more long, 1-2 mm. in diameter, slightly flattened in places, irregularly and inconspicuously transversely cracked; medulla K intense yellow; ramuli close, 5-10 mm. long, the longer sparsely isidiose; apothecia 10 mm. in diameter, concave; exciple with cracked, areolate cortex; marginal cilia few and very short; disc chalky white; Congo.....*U. Alsteeniana* Duvign.
105. Thallus pale ashy, more than 20 cm. long, 0.9 mm. in diameter; ramuli sparsely, irregularly disposed, 10-30 mm. long; white tubercles, each bearing a few isidia; medulla white, K intense citrine yellow; Togo, Fernando Po and St. Helena...72 *U. Lyngei* Motyka
105. Thallus stramineous green or yellowish, very indistinctly longitudinally rugose.....106
106. Thallus more than 60 cm. long, 1 mm. in diameter, terete, chamois to deep colonial buff; ramuli 10-20 mm. long; apothecia 3-5 mm. in diameter, exciple smooth; Tanganyika and Nyasaland.....96. *U. amaniensis* Dodge
106. Thallus more than 80 cm. long, 1.2-1.5 mm. in diameter, terete, yellow stramineous; ramuli 10 (-20) mm. long, curved; apothecia 2-4 mm. in diameter, exciple smooth, eciliate; Madagascar and Mauritius.....97. *U. eburnea* Motyka
106. Thallus gray green, 50 cm. or more long, 0.5 mm. in diameter; cortex areolate but not scaling off, sometimes appearing farinose from coalescent scars of fallen isidia; ramuli 3-5 mm. long, dense; short lateral branches tuberculate-isidiose; apothecia 3-4 mm. in diameter, exciple nearly smooth to very slightly pitted; marginal cilia few; Congo.....98. *U. savanarum* Duvign.
106. Thallus only about 30 cm. long.....107
107. Thallus about 0.7 mm. in diameter, terete; ramuli mostly 4-10 mm. long, the longer branched, subpapillate, bearing minute propagula; axis with yellow hyphae; Madagascar and Nyasaland.....99. *U. indigena* Motyka
107. Thallus about 1 mm. in diameter, terete with oblique longitudinal low ridges (giving a contorted appearance); ramuli irregular, 10-20 mm. long, subhelically twisted, tuberculate; soredia not seen; axis with dark hyphae; Kenya to Cape of Good Hope, Madagascar, Mauritius, and Réunion.....100. *U. contorta* Jatta
108. Primary branches 0.5-1 mm. in diameter; ramuli 10-20 (-30) mm. long.....109
108. Primary branches 0.4-0.6 mm. in diameter; ramuli 3-10 (-15) mm. long.....110
109. Thallus olive buff where corticate, branches 1 mm. in diameter; ramuli 10-20 (-30) mm. long, close; medulla K bright yellow; Congo, Sudan to S. Rhodesia.....101. *U. arguta* Motyka
109. Thallus grayish green or grayish yellow, branches 0.6-1 mm. in diameter, surface rugose, mostly decorticate with spinules up to 3 mm. long; ramuli 10-20 mm. long, sub-distant, simple or forked, the longer sparsely spinulose; sterile; Congo.....*U. barbelata* Duvign.
110. Thallus colonial buff, corticate; ramuli deep olive buff, branches wholly decorticate, 0.4-0.6 mm. in diameter; ramuli 3-10 (-15) mm. long, close; apothecia 3-8 mm. in diameter, plane; exciple smooth to sublacunose, marginal cilia few, 10 mm. long; disc carneous, lightly pruinose; Sudan to S. Africa, Madagascar and Réunion.....102. *U. trichodeoides* Vainio
110. Thallus yellowish green; axils and base of ramuli somewhat flattened; main branches decorticate, tartareous; ramuli 3-10 mm. long, close, tips black; apothecia lateral, 2-3 mm. in diameter, concave; exciple rugulose; marginal cilia abundant, up to 10 mm. long; disc white; Congo.....*U. katangensis* Duvign.
110. Thallus gray green, 50 cm. or more long, 0.5 mm. in diameter; cortex areolate but not scaling above, sometimes farinose from coalescent scars of fallen isidia; ramuli 3-5 mm. long, dense; short lateral branches tuberculate-isidiose; apothecia 3-4 mm. in diameter, exciple nearly smooth to slightly pitted; marginal cilia few; disc white; Congo.....98. *U. savanarum* Duvign.

1. *USNEA cervicornis* Dodge, sp. nov.

Type: Southern Rhodesia, Makoni Inyanga District, summit of Forest-Hill Kop, 1700 m., on shaded rock face, *Frederick Eyles 827*, at Kew.

Thallus erectus, ad 8 cm. altitudine, 2 mm. diametro, teres, ad axillas complanatus, olivaceo-alutaceus; cortex areolatus, subfoveolatus, minute et irregulariter papillatus, papillis apicibus nigratis; eramulosus. Apothecia lateralia, 8 mm. diametro, margine crenato, eciliato aut cum 1-2 ciliis ad 8 mm. longitudine, ca. 0.5 mm. diametro, subinflatis, apicibus obtusis; discus brunneo-alutaceus, epruinus.

4. *USNEA nutans* Dodge, sp. nov.

Type: Kenya, Northern Frontier Province, Mt. Kulal, 1935 m., on exposed rock, *P. R. O. Bally 5686*, at Kew.

Thallus erectus vel decumbens, rigidus, ca. 8 cm. altitudine, cinnamomeo-alutaceus ad obscure olivaceo-alutaceus in ramis ultimis; hapteron 5 mm. diametro, cum decem vel pluribus ramis perpendiculariter dichotomis, curvatis, apicibus recurvis nutantibusque, teretibus, laevibus; cortex inferne annulatus subareolatusve, superne minute verrucosus; isidia singula; eramulosus, rami ultimi nutantes, laeves, apicibus nigris. Apothecia non visae.

5. *USNEA Dodomae* Dodge, sp. nov.

Type: Tanganyika, Dodoma Prov., Mt. Mpwapwa, 1610-1935 m., saxicole, *P. J. Greenway 2432*, in East African Herb.

Thallus erectus vel decumbens, 10 cm. altitudine, rigidus in virgultis densis ex gompho communi flavo, brunneo-olivaceus, Isabellinusve ad melleus in ramis ultimis; rami 1.5 mm. diametro ad basim nigricantem ad 2 mm. diametro sub dichotomo primo, rami ultimi ad 7 cm. longitudine, flexuosi, eramulosi; cortex inferne fractus et subareolatus, superne laevis; isidia spinulosa fere totam plantam tegentia. Apothecia non visa.

6. *USNEA pulvinulata* Dodge, sp. nov.

Type: Uganda, Kigezi, Kasatoro forest, 1935-2560 m., on trees, *I. R. Dale L39*, at Kew.

Thallus fruticosus, erectus, ad 5 cm. altitudine, ramis 1 mm. diametro, obscure olivaceo-alutaceus, dichotome vel sympodialiter ramosus, internodiis brevibus, pulvinulum hemisphericum formans; cortex inferne nigricans, annulatim fractus subareolatusve, superne laevis; densissime ramulosus, ramuli acuminati, 0.5-3 mm. longitudine, recti; medulla inferne rubra.

Apothecia subterminalia, ad 15 mm. diametro, primum cupulata dein subplana; excipulum tenuiter scrobiculatum, rugis ramulosis; cilia marginalia caespitosa, ca. 2 mm. longitudine, apicibus acuminatis; discus laevis, juventute dense albo-pruinus dein rufus vel subaurantiacus.

8. *USNEA subcristata* Dodge, sp. nov.

Type: Tanganyika, Kondo District, Swaga-swaga Hill, summit, 1775 m., on shrubs, chiefly *Trichalisia cacondensis*, B. D. Burtt 891.

Thallus rigidus, fruticosus, erectus, 7–8 cm. altitudine, inferne pallide brunneo-olivaceus, superne Isabellinus vel melleus; rami basi 2 mm. diametro ad 3 mm. expansi dein ad 1 mm. sub apotheciis, tenuescens, angulati, papillati; cortex subareolatus; rami secundarii 1–1.5 mm. diametro, axi principali similes; ramuli 1–15 mm. longitudine, minores sublaeves, majores foveolati, apicibus rotundatis.

Apothecia terminalia, plana, ad 20 mm. diametro, excipulo laevi vel papillato radialibus cum rugis; cilia marginalia subdistantia in duobus ordinibus disposita, extera crassa, dichotoma, intera 1–2 mm. longitudine, apicibus acutis; discus vinaceo-alutaceus, pruinosis.

10. *USNEA nana* Dodge, sp. nov.

Type: Uganda, Kigezi, Kasatoro, Kabale River, 2256 m., corticole, I. R. Dale L43 p. p. min.

Thallus fruticosus, erectus, ad 4 cm. altitudine, olivaceus, dichotome ramosus, teres, ad 1 mm. diametro superne tenuescens, dense ramulosus; ramuli 1–2 (–4) mm. longitudine, curvati, apicibus obtusis, raro dichotomi.

Apothecia sessilia in ramis tenuibus secundariis, cupulata, 1 (–2) mm. diametro, excipulo laevi; cilia marginalia caespitose radiantia, 1 mm. longitudine; discus concavus, carneus, albo-pruinosis.

12. *USNEA medio-africana* Dodge, sp. nov.

Type: Uganda, Kigezi, Mafuga, 2400 m., on trees, I. R. Dale L41, at Kew.

Thallus erectus, subrigidus, circa 5 cm. altitudine, 1.5 mm. diametro, super basim semel aut bis dichotome ramosus, obscure brunneus, ramulis olivaceo-alutaceis; teres vel subrugosus vel subfoveolatus; ramuli densi, 5–7 mm. longitudine, fragillimi, laeves, apicibus acutis nigricantibus.

Apothecia subterminalia, ad 20 mm. diametro, plana; excipulum foveatum, minute verrucosum, radiantibus cum rugis ex ramulis conrescentibus formatis; cilia marginalia longitudine variabili, ad 8 mm. longitudine; discus cinnamomeus, leviter albo-pruinosis.

13. *USNEA brunnescens* Dodge, sp. nov.

Type: Uganda, Kigezi, Mafuga, 2400 m., on trees, I. R. Dale L41, at Kew.

Thallus erectus, fruticosus, rigidus, ad 10 cm. altitudine, fusco-brunneus, ramulis cinnamomeo-alutaceis; basi bis vel ter dichotomus, ca. 2 mm. diametro, ad 0.3 mm. tenuescens in apicibus obtusis; cortex inferne impressus subareolatusque, sublaevis, superne dense verrucoso-papillatus; ramuli 1–3 mm. longitudine, in ordinibus verticalibus, majores sparse verrucosi, singulis cum isidiis.

24. *USNEA ARTICULATA* (L.) Hoffm. subsp. *aethiopica* Dodge, subsp. nov.

Type: Ethiopia, below Debra Erki, on fir, *Schimper 18*, 21 Oct. 1850. det *U. articulata* v. *intestiniformis* Ach. by Müller Argau at Kew.

Thallus pendens, flaccidus, plus quam 25 cm. longitudine, brunneus; basis 1 mm. diametro, 8 mm. longitudine, annulatus, non nigricans; dichotome ramosus, ramis articulatis, articulis irregularibus, curvatis, cucumiforibus, 4–5 mm. diametro, 25–30 mm. longitudine, foveatis vel scrobiculatis, pseudocyphellatis, vel subrectis, 1–1.4 mm. diametro, 5–10 mm. longitudine minutis cum pseudocyphellis; rami terminales, tenues, fere non articulati, dense ramulosi, ramulis 5 mm. longitudine isidio-sorediosis.

34. *USNEA cameroonensis* Dodge, sp. nov.

Type: Cameroons, *Miss Cheeseman L3*, at Kew.

Thallus pendens, flaccidus, plus quam 55 cm. longitudine, axes principales brunnei vel cinnamomei, ramulis olivaceo-alutaceis; articulati, dichotome ramosi; axillis complanatis, articulis ca. 10 mm. longitudine, 1 (–1.5) mm. diametro, non conspicue inflatis, longitudinaliter rugosis, rugis tenuibus acutis, dorsis fractis farinosisque; ramuli irregulariter dispositi, ad 30 mm. longitudine, basi subarticulati inflatique, ad apicem acutum tenuescentes, tuberculati deformatique; soredia isidiosa. Apothecia non visa.

36a. *USNEA DECIPIENS* Motyka var. *Rhodesiana* Dodge, var. nov.

Type: Southern Rhodesia, Matopos District, top of high granite hill, 1610 m., on tree, *Frederick Eyles 1023*, at Kew.

Thallus pendens, subflaccidus, plus quam 30 cm. longitudine, Isabellinus, infrequenter dichotome ramosus, nec articulatus nec annulatus, longitudinaliter et subreticulate rugosus, rugis subacutis, dorso fracto, inter rugas sulcatus, 1 mm. diametro, superne tenuescens sed sine summitatibus capillaceis; ramuli caespitosi, 3–15 mm. longitudine; tubercula farinosa sorediosa.

39. *USNEA terricola* Dodge, sp. nov.

Type: Cameroons, Mamoquilles, 2450 m., terricole among mosses and *Stereocaulon* sp., *Miss Cheeseman 25*, at Kew.

Thallus fruticosus, subrigidus, 8–10 cm. altitudine, cinnamomeo-alutaceus, axibus principalibus irregulariter nigro-maculatis, summitatibus obscure olivaceo-alutaceis; basis nigra, dense dichotoma, ramis inferne 1 mm. diametro in medio ad 2–3 mm. dilatatis, dein superne ad 0.5 mm. tenuescentibus; articulatis, articulis 5–20 (–30) mm. longitudine, apicibus constrictis, basalibus sublaevibus, minutis cum pseudocyphellis; cortex fractus, rugis sulphureo-farinosus, isidiosis cum sorediis; superne articulis plus minusve minute verrucosis, rugis plus elevatis et subreticulatis, soraliis majoribus elevatis, sorediis isidiosis. Apothecia non visa.

49. *USNEA blepharoides* Dodge, sp. nov.

Type: Tanganyika, Kilimanjaro, at upper limit of forest, 3000 m., *G. Geilinger 4417*, at Kew.

Thallus fruticosus, pauci-ramosus, prostratus vel suberectus, ca. 9 cm. longitudine, subarticulatus, inferne 2 mm. diametro, ad 1 mm. diametro sub apotheciis tenuescens, subverrucosus, axibus fulvo-olivaceis, ramulis ciliisque cinnamomeo-alutaceis; ramuli subdistantes, 4–5 (–10) mm. longitudine, curvati, basi subarticulati inflatique, sparse papillati, apicibus acuminatis. Apothecia sessilia, geniculata, subplana; excipulum minute verrucosum; cilia marginalia distantia, ad 10 mm. longitudine, acuminata; discus planus, carneus, tenuiter albo-pruinosis.

62. *USNEA subfoveata* Dodge, sp. nov.

Type: Uganda, Bunyoro, Busingoro, on bark of *Jacaranda*, *I. R. Dale L69*.

Thallus fruticosus, erectus, rigidus, 5 cm. altitudine, flavo-ochraceus, dense dichotomus, articulatus, articulis 1–1.5 mm. diametro, 10 mm. longitudine, apicibus constrictis; rami secundarii teretes, subfoveati, papillati in rugis; isidia singula vel bina in apicibus papillarum; eramulosus. Apothecia subterminalia, ad 9 mm. diametro, cupulata, dein plana; excipulum laeve vel verrucosum et subimpressum; cilia marginalia distantia, ad 1.5 mm. longitudine, medio inflata, apicibus subacutis; discus concavus dein planus, ochraceo-alutaceus, tenuiter albo-pruinosis.

73. *USNEA Gossweileri* Dodge, sp. nov.

Type: Angola: Cuanza Sul, Amboim, Capir near the Carloaongo River, 1000 m., on dead trees, *J. Gossweiler 9991*.

Thallus erectus, fruticosus, 5–6 cm. altitudine, olivaceo-alutaceus, inferne sympodialiter, superne dichotome ramosus; rami ca. 1 mm. diametro, annulati, dense verrucosi-tuberculati, teretes; soralia super tuberculos insidentia, isidiosis cum sorediis; ramuli 2–3 (–5) mm. longitudine, irregulariter dispositi, breviores laeves, longiores minute tuberculati. Apothecia rara, sessilia, 3 mm. diametro; excipulum laeve; cilia marginalia subdistantia, 1–2 mm. longitudine, conica; discus carneus albo-pruinosis.

76. *USNEA isabellina* Dodge, sp. nov.

Type: Kenya, Northern Frontier Province, near Buna, summit of Ajao hill, 1030 m., on bushes, *I. R. Dale L71*.

Thallus erectus, rigidus, 7 cm. altitudine, isabellinus; rami 1–1.8 mm. diametro, dichotome ramosi, teretes; cortex laevis, annulatim fractus subareolatusque; ramuli densi fragiles, 2–4 mm. longitudine, crassi, subverrucosi sed non sorediosi; apicibus subnigricantibus; summitates ad 4 cm. longitudine, tenues. Apothecia rara, ca. 5 mm. diametro, lateraliter sessilia, plana vel subconvexa; excipulum laeve, subrugosumve; cilia marginalia distantia, fragilia, longitudine variabilia, plus quam 3 mm. longitudine, ramulis similia; discus avellaneus, tenuiter albo-pruinosis.

78. *USNEA Dalei* Dodge, sp. nov.

Type: Kenya, Northern Frontier Province, near Buna, summit of Ajao hill, 1030 m., on bushes, *I. R. Dale L70*, at Kew.

Thallus pendens, subrigidus, plus quam 16 cm. longitudine, inferne aurantiacocinnamomeus, superne obscure olivaceo-alutaceus, roseo-maculatus; basi subnigricans annulatusque; dichotome ramosus, axibus principalibus ca. 1 mm. diametro ad apicibus tenuescens, acute angulatus ex tuberculis papilliformibus concretescentibus, inter rugis sulcatis, dense ramulosus in rugis corticatis; ramuli 4 (-15) mm. longitudine, curvati flexuose, tuberculati, cum spinulis paucis; summitates tenues, non ramosae nec capillaceae.

82. *USNEA spilotoides* Dodge, sp. nov.

Type: Kenya, Chyulu hills, *H. D. van Someren*, in E. African Herb.

Thallus procumbens aut pendens, subrigidus, ca. 10 cm. longitudine, fulvus, ramulis pallide olivaceo-alutaceis; sympodialiter ramosus, ad 0.9 mm. diametro, ad summitates subcapillaceas tenuescens; inferne articulatus, articulis subinflatis, apicibus constrictis, longitudine variabili, minute albo-verrucosus, soreidiis isidiosis; ramuli subdistantes, ca. 1 mm. longitudine, laeves, apicibus acutis; summitates fragiles, ad 20 mm. longitudine, apicibus acuminatis. Apothecia non visa.

83a. *USNEA MEYERI* var. *chondroclada* (Steiner) Dodge, comb. nov.

Usnea chondroclada Steiner, Verhandl. Zool. Bot. Ges. 53:228. 1903.

96. *USNEA amaniensis* Dodge, sp. nov.

Type: Tanganyika, East Usambara, Amani-Maramba, 1030 m., growing in festoons on the topmost branches of tall evergreen rain-forest trees, *P. J. Greenway 4151*, ex Herb. E. African Agr. Res. Sta., Amani.

Thallus prostratus, ramis tenuioribus pendentibus, rigidus, plus quam 60 cm. longitudine, flavo-alutaceus, basi nigrescens, dichotome ramosus, 1 mm. diametro, superne ad summitates capillaceas tenuescens, teres, laevis; cortex annulatim fractus; ramuli 10-20 mm. longitudine, tenuissimi, recti vel curvati, fragiles, apicibus acuminati, minute tuberculati. Apothecia in ramulis sessilia, cupulata dein fere plana, eciliata; excipulum laeve; discus fuscus, albopruinosus.

(To be continued)